School District of Marshfield Course Syllabus

Course Name: DC Advanced Manufacturing II PS
Length of Course: Semester
Credit: 1/2 Credit

Program Goal:

Empower learners to be college and career ready through standards-based experiences in the classroom and career-based learning experiences with business and industry partners. Learners will engage through technology in design, building, problem-solving, repair or service, in a collaborative environment through theory and hands-on experiences.

Course Description:

This course builds off the content learned in Advanced Manufacturing I. During the course, learners will focus on more in depth concepts on the CNC equipment throughout the MHS Technology Education department. Learners will work through programming, setup, and running of CNC equipment. Each piece of equipment will have a hands-on project that learners will design and create. This class is intended for learners that are interested in pursuing a career in the areas of machining, programming, and engineering.

Board Approved April 2023

MSTC Course Title: Introduction to Milling Machines
Course Number: MSTC 32-420-337
Total Credits: 2
Students must also complete DC Advanced Manufacturing I to receive Dual Credit

Wisconsin Standards for Technology and Engineering (TE)	
Engineering (ENG)	
ENG2: Students will analyze and demonstrate engineering design.	
Analyze the attributes of engineering design ENG2.a	2.a.7.h: Recognize that engineering design is influenced by person characteristics, such as creativity, resourcefulness and the ability to visualize and think abstractly.
Describe and apply engineering design ENG2.b	2.b.4.h: A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.
Manufacturing (MNF)	
MNF1: Students will be able to select and use manufacturing technologies.	
Identify, select, and safely use tools, machines, products, and systems for specific tasks MNF1.a	1.a.9.h: Select and apply the appropriate units and scales for situations involving measurement.
Create and communicate alternative solutions MNF1.b	1.b.5.h: Apply methodical problem-solving models which include input, process, outcome, and feedback components.
Demonstrate cooperation with others in ways to exhibit respect for individual and cultural differences and for the attitudes and feelings of others MNF1.c	1.c.10.h: Recognizing how to bring together projects individually and in teams for effective performance and the achievement of objectives.
Select, use, and identify manufacturing processes, such as casting, forming, machining, joining, rapid manufacturing (CNC) and treating/coating MNF1.d	1.d.5.h: Recognize durable goods are designed to operate for a long period of time, while nondurable goods are designed to operate for a short period of time. 1.d.6.h: Demonstrate the interchangeability of parts increases the effectiveness of manufacturing processes.
Select, use and identify manufacturing systems MNF1.e	1.e.6.h: Recognize manufacturing systems may be classified into types, such as customized production, batch production and continuous production. 1.e.8.h: Use a manufacturing system to produce a product.
Wisconsin Common Career Technical Standards (WCCTS)	
Creativity, Critical Thinking, Communication and Collaboration (4C)	
4C1: Students will think and work creatively to develop innovative solutions to problems and opportunities.	

Develop original solutions, products, and services to meet a given need 4C1.a	1.a.8.h: Design a product or service that could fulfill a human need or desire. 1.a.9.h: Apply past experiences to current problems in developing innovative solutions.
Work creatively with others to develop solutions, products, and services 4C1.b	1.b.9.h: Work as part of a team to improve an existing product or process.
Career Development (CD)	
CD3: Students will create and manage a flexible and responsive individualized learning plan to meet their career goals.	
Investigate the world of work in order to gain knowledge of self in order to make informed career decisions CD3.a	3.a.10.h: Analyze how career plans may be affected by personal growth, external events and changes in motivations and aspirations. 3.a.14.h: Implement an individual learning plan to maximize academic ability and achievement.
Leadership (LE)	
LE1: Students will apply leadership skills in real-world, family, community and business and industry applications.	
Implement leadership skills to accomplish team goals and objectives. LE1.a	1.a.10.h: Exhibit skills such as compassion, service, listening, coaching, developing others, team development. 1.a.12.h: Exhibit skills such as innovation, intuition, adaption, life-long learning, and coach-ability to develop leadership potential over time.

Technical College Learning Outcome and Competencies:

Course Competencies

- Use the different parts of a vertical mill.
- Calculate cutting speeds and feeds.
- Produce holes and slots on the vertical mill by center drilling, drilling reaming and milling.
- Use the correct size drill for a tapping operation.
- Demonstrate safe work practices on Vertical Milling machines.
- Utilize non-precision, precision, and comparison measuring tools.

Program Outcomes

- Apply basic safety practices in the machine shop (TSA)
- Interpret industrial/engineering drawings (TSA)
- Apply precision measuring methods to part inspection (TSA)
- Perform basic machine tool equipment set-up and operation (TSA)
- Perform programming, set-up, and operation of CNC Machine Tools (TSA)
- Perform advanced CNC machining operations (TSA)

Key Vocabulary:			
XYZ Axis	Datum	CAM	CNC
Edge Finder	End Milling	Feed Rate	G-code
M-Code	Jig	Insert	Milling
Turning	Tool Changer	Collet	Cutting Speed
Cutting Feeds	Face Milling	Parallels	Toolpaths

Topics/Content Outline- Units and Themes:

Semester 2:

- Subtractive 2d Manufacturing
  - Spot Drilling
  - Drilling Cycle
- 3D Manufacturing (Milling)
  - Adaptive Clearing
  - 3D contouring
- Production Manufacturing
  - Runtime
  - Tool wear
  - Precision and Tolerances

Primary Resource(s):
Fusion 360
Aspire
Corel Draw
Inventor
AutoCAD
Visual Studio Code
Titans of CNC Academy
Haas Technical Education Community